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TIMBER STRUCTURES FOR SPORT INSTALLATIONS
ДЕРЕВЯННЫЕ КОНСТРУКЦИИ ДЛЯ СПОРТИВНЫХ СООРУЖЕНИЙ

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For the last few years the Russian Federation has been developing sport activity intensively. The sport events chronology is impressive: in 2013 the World XXVII summer Championship in Kazan was held with Winter Olympic Games in Sochi in 2014. In 2019 Krasnoyarsk will host the XXIX World Winter Championship. These grand in scale events require enormous labor and financial costs on all levels of realization especially on the stage of sport installations construction.

The authors of the article together with the scientists of Siberia Federal University (Krasnoyarsk, Russia) are trying to reduce these costs by creating the construction systems combining the capacity of realization of different span, configuration and functional purposes of buildings and structures. The most important system-forming factor to be taken into consideration in creating the systems is the use of timber, the potential of which has not yet been fully investigated.

The paper considers the following aspects:

Issues of form-finding of sport buildings;

Spatial structures joints and elements design;

Optimization and economic appropriateness problems;

Variants of use of production waste for structures cost reduction.

For short-span installations spatial rod systems of a closed type with a regular net are suggested. All bearing elements have round sections and are manufactured both from timber and plywood waste, the so-called “pencils”(fig.2).

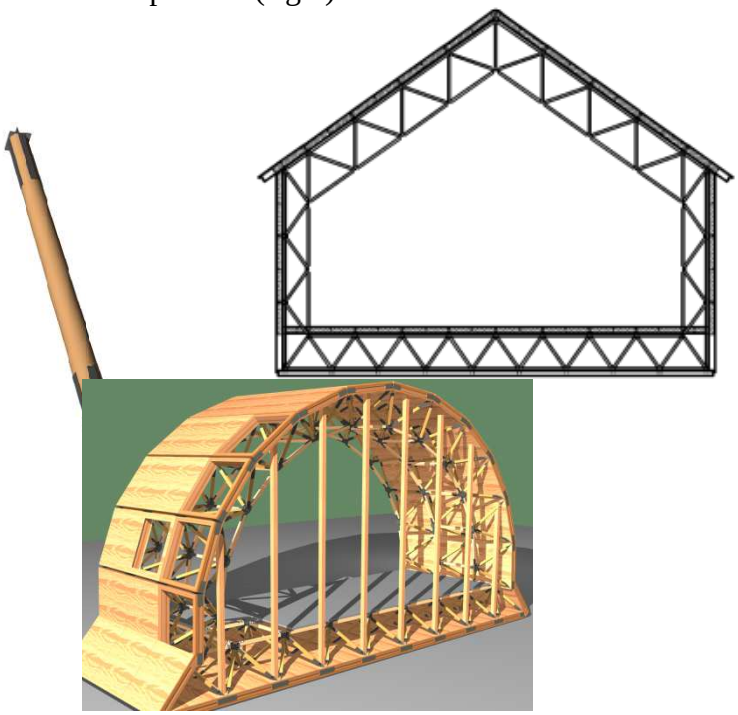

Fig. 2. Construction of spatial rod systems with a regular net.

For medium-sized and large-span constructions, systems with connected between them bearing elements along a geometric net with a square or rectangular cell are proposed. The

length of all cross - membered elements equals two sides of the vault cell. They lie along the vault arc and in chess order on its surface, forming polygonal interchangeable arches. Longitudinal elements are arranged in straight lines along the vault and their number equals the number of joints in two neighboring arches. All bearing elements are manufactured from constant or variable in length (depending on the span) sections(fig.2).

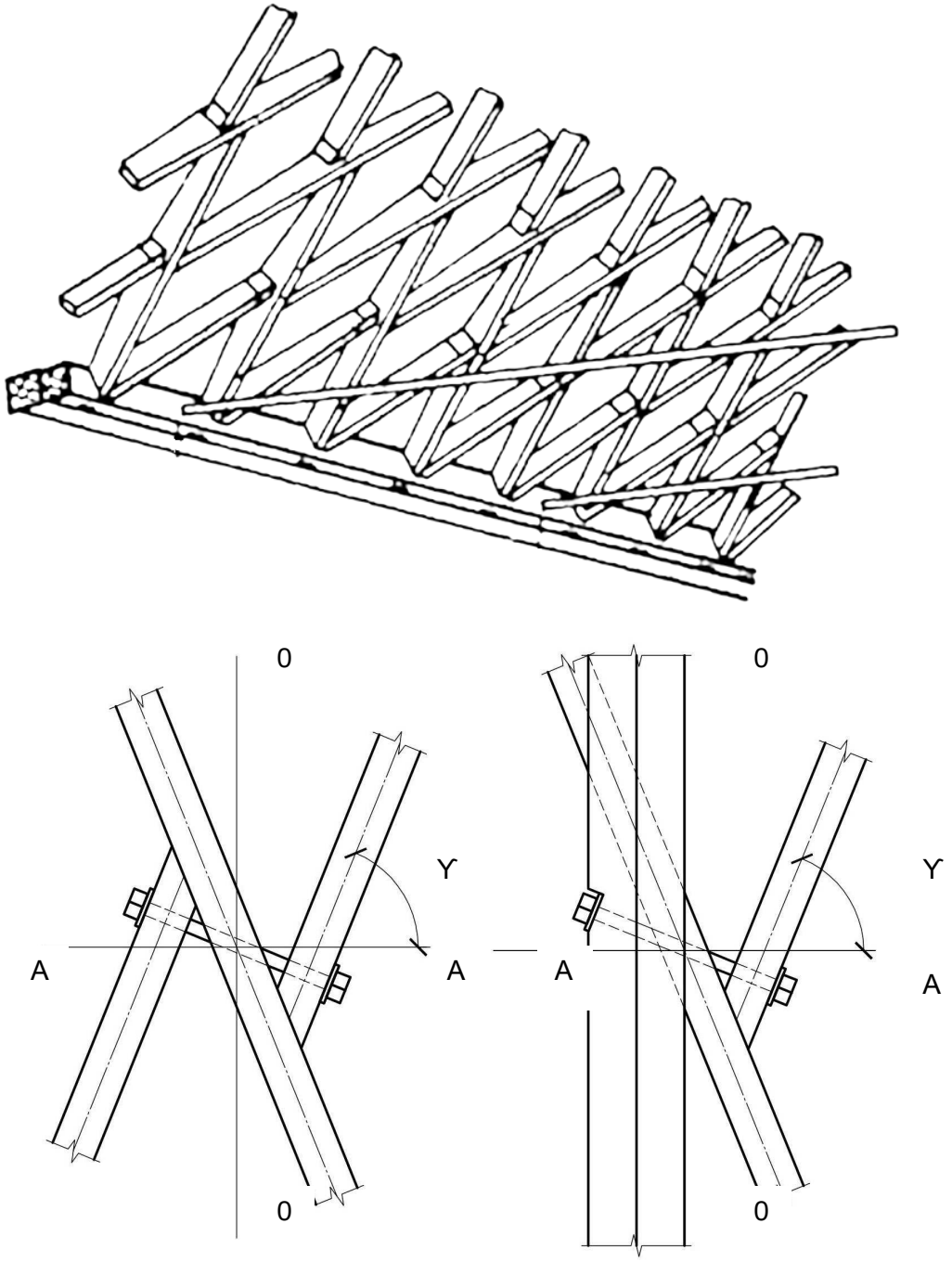

Fig.2.Construction of vault arc and in chess order.

As a result of the use of afore-mentioned structures in sport constructions with a 9-80 m span economic effect is achieved due to the whole timber low cost compared to metal, reinforced concrete and glued wood. Labor and time costs of installation erection are reduced at the expense of the used elements uniformity and block assembly.